



MARKED-UP CLAIMS

WHAT IS CLAIMED IS:

Please cancel Claims 1-3 without prejudice.

4. A press, comprising:

a slide;

a press drive system to cause said slide to move said
drive system having a press drive motor;

a driveshaft, said driveshaft having a first end and a
second end, said first end connected to said press motor;

a pinion, said pinion connected to said second end of
said driveshaft;

a main gear, said main gear driven by said pinion; and

a crankshaft, said crankshaft having a first end and a
second end, said first end of said crankshaft connected to said
main gear; and

a variable output differential operatively connected to said
drive system, said variable output differential producing slide
dwel, [The press as recited in Claim 2,] wherein said
differential is rotatably supported by said crankshaft.

5. The press as recited in Claim 4, further comprising:

differential movement means for rotating said
differential relative to said drive system and thereby increasing
or decreasing the output of said differential relative to said
drive system.

6. The press as recited in Claim 5, wherein said
differential comprises:

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an input gear differential, said input gear differential affixed to said main gear, said input gear differential rotatably supported by said crankshaft;

a pinion differential mechanically coupled to said input gear differential;

a shaft, said shaft rotatably supporting said pinion differential;

10. a gear output differential mechanically coupled to said pinion differential; and

a differential housing.

7. The press as recited in Claim 6, wherein said differential further comprises:

a second pinion differential mechanically coupled to said input gear differential and to said gear output differential; and

a second shaft, said second shaft rotatably supporting said second pinion differential.

8. The press as recited in Claim 5, wherein said differential movement means comprises:

a link spider pivotally connected to said differential housing;

5 a pivot link, having a first end and a second end, said pivot link pivoting about said second end, said link spider pivotally connected to said pivot link; and

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10 a link main gear, said link main gear pivotally
connected to said first end of said pivot link, said link main
gear pivoting said pivot link back and forth about said second
end.

9. The press as recited in Claim 8, wherein said link main
gear is pivotally connected to said main gear.

10. The press as recited in Claim 8, wherein said
differential movement means further comprises:

adjustment means for varying the position of said link
spider along said link pivot.

11. The press as recited in Claim 10, wherein said
adjustment means comprises:

a hydraulic motor;

5 a pinion link pivot, said pinion link pivot mounted on
said hydraulic motor;

a controller for controlling and identifying the
position of said link spider;

[an encoder for feeding pulses indicative of rotations
of said hydraulic motor to said controller;]

10 a gear link pivot driven by said pinion link pivot;

a nut link spider affixed to said gear link pivot;

a screw link spider threadedly connected to said nut
link spider, said screw link spider supported on three sides by
said pivot link, said nut link spider including pressurized oil

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15 to prevent undamped clearance between said screw link spider and
said nut link spider;

a pin link spider for pivotally connecting said link
spider to said screw link spider; and

20 a retainer connected to said link pivot, said retainer
holding said screw link spider in place within said pivot link.

12. The press as recited in Claim 10, wherein said link
spider further comprises:

link spider length adjustment means for varying the
length of said link spider.

13. The press as recited in Claim 12, wherein said link
spider length adjustment means comprises:

a hydraulic cylinder.

14. The press as recited in Claim 10, wherein said link main
gear further comprises:

link main gear length adjustment means for varying the
length of said link main gear.

15. The press as recited in Claim 14, wherein said link main
gear length adjustment means comprises:

a hydraulic cylinder.

16. A press, comprising:

a slide;

a press drive system to cause said slide to move said press
drive system having a press drive motor;

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5 a driveshaft, said driveshaft having a first end and a
second end, said first end connected to said press motor;

a pinion, said pinion connected to said second end of
said driveshaft;

a main gear, said main gear driven by said pinion; and

10 a crankshaft, said crankshaft having a first end and a
second end, said first end of said crankshaft connected to said
main gear; and

a variable output differential operatively connected to said
drive system, said variable output differential producing slide
15 dwel, wherein said differential is rotatably supported by said
driveshaft, [The press as recited in Claim 3,] wherein said press
drive system [further comprises:] includes

 [a motor;]

 a flywheel driven by said motor;

20 a clutch, said clutch being selectively engageable with
said flywheel;

 said driveshaft affixed to said clutch;

 a pinion affixed to said driveshaft;

 a main gear driven by said pinion; and

25 said crankshaft affixed to said main gear.

17. The press as recited in Claim 16, further comprising:

 a planetary gearing, said planetary gearing
mechanically coupled to said clutch; and

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5 a link spider, said link spider pivotally connected to
said planetary gearing and to said differential.

Please cancel Claim 18 without prejudice.

19. A method of varying the slide motion in a running
mechanical press, comprising:

connecting a differential to the press drive system;

and

5. utilizing the differential to alternatively add and
subtract to the rotational velocity of the press crankshaft
relative to the rotational velocity of the press drive system.

Please cancel Claims 20 and 21 without prejudice.

MARKED-UP SPECIFICATION

Fig. 1 is a elevational view of a mechanical press incorporating the infinite variable slide motion system of the present invention;

Fig. 2 is a graph showing a motion versus crankshaft angle curve for both a conventional press (dashed line) and one of the present invention (solid line);

Fig. 3 is an end view of a portion of the mechanical press shown in Fig. 1;

Fig. 4A is a top [and side] view of a portion of the press shown in Fig. 1;

Fig. 4B is a side view of a portion of the press shown in Fig. 1;

Fig. 5 is an engaged view of an embodiment of the drive mechanism of the present invention;

Fig. 6 is a diagram of the main gear, link pivot connection of one form of the invention;

Fig. 7 is a section view of an embodiment of the differential utilized in the present invention;

Fig. 8 illustrates means for effective link position length adjustment utilizing a hydraulic motor;

Fig. 8A is a sectional view of the main gear link connection;

Fig. 8B is a sectional view of the spider link connection;

Fig. 9 is a section view of an alternate embodiment of the present invention utilizing planetary gears and connection of the differential to the press driveshaft; and